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ACADEMIC PAPER

Student investment in a research methods course: The influence of achievement goals on motivational patterns

Howard Hall (h.hall@yorksj.ac.uk) and Andrew Hill (a.hill@yorksj.ac.uk)
Faculty of Health and Life Sciences, York St John University,
Lord Mayor's Walk, York YO31 7EX, UK

Paul Appleton (p.appleton@bham.ac.uk)
School of Sport and Exercise Sciences, University of Birmingham,
Edgbaston, Birmingham, B15 2TT, UK

Stephen Kozub (steve.kozub@beds.ac.uk)
School of Physical Education and Sport Sciences, Faculty of Education & Sport,
University of Bedfordshire, Bedford campus, Polhill Avenue, Bedford, MK41 9EA, UK

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Abstract

The purpose of this study was to examine the influence of mastery, performance approach and performance avoidance goals on patterns of achievement-related cognition and affect in first-year students undertaking a research methods module. Students' goals and measures of self-determination were assessed towards the beginning of the module, and measures of achievement-related cognition and affect were assessed before and after each of three graded statistics assignments. Students were grouped by means of a cluster analysis on their achievement goals, and repeated measures multivariate analysis of variance revealed that a cluster of failure-avoidant students exhibited motivational patterns that were significantly more debilitating than those exhibited by a cluster of mastery-oriented students

Howard Hall is professor of sport and exercise psychology at York St John University. He is a former vice-president of the International Society of Sport Psychology and is president elect of the International Association of Applied Psychology, Division 12. This research was conducted at the University of Bedfordshire when he was seconded to the Centre for Excellence in Teaching and Learning. Howard's research is concerned with understanding the psychological processes underlying achievement motivation and perfectionism.

Andrew Hill is a senior lecturer in the Faculty of Health and Life Sciences at York St. John University. A former undergraduate and doctoral student at the University of Bedfordshire, Andrew is completing a PhD under the guidance of Howard Hall on multi-dimensional perfectionism and its influence on cognition affect and behaviour in sporting contexts.

Paul Appleton recently completed his PhD at the University of Bedfordshire and this examined factors influencing the development of perfectionism in junior athletes. After serving for three years as a lecturer in the School of PE and Sport Science at the University of Bedfordshire, Paul took up an appointment as a senior research fellow at the University of Birmingham, where he is working on an EU funded project on children's motivation and psycho-social health.

Stephen Kozub is a principal lecturer in sport psychology at the University of Bedfordshire. His research is broadly concerned with group dynamics and leadership. He is currently working on how qualities of perfectionism in athletes can influence interpersonal dynamics in sports teams.

and achievement-oriented overstrivers. Implications for enhancing the potentially dysfunctional motivation of failure-avoidant students are discussed.

Keywords: student motivation; research methods; achievement goals

Introduction

Students entering universities to study sport-related subjects often experience motivational difficulties when undertaking research methods and statistics courses (Lane, Hall, & Lane, 2002). For many, the relevance of such courses is not always apparent when first embarking on a degree programme. Yet, despite attempts to engage students with the subject matter and promote adaptive motivation, a significant number will exhibit dysfunctional patterns of motivation that may impede the potential for both learning and achievement (Middleton & Midgley, 1997; Midgley, Kaplan, & Middleton, 2001).

Some researchers (Covington, 1992; Dweck, 1999) have argued that when students exhibit maladaptive patterns of motivation, engagement with the learning process is superficial. This may be reflected in minimal effort on independent study, challenge avoidance, a lack of persistence when encountering complex material and failure to seek help when experiencing academic difficulties (Dweck, 1999; Dweck & Leggett, 1988). Motivational problems may become further compounded when performance difficulties are experienced on graded assignments. However, in order to understand the psychological processes that give rise to qualitative differences in student motivation, research suggests that educators should attend to those factors which give meaning to achievement and influence personal investment strategies (Elliot & Covington, 2001; Elliot, McGregor, & Gable, 1999; Midgley et al., 2001).

The influence of achievement goals on student motivation

According to contemporary motivational theories (Duda & Hall, 2001; Dweck & Elliot, 2005; Roberts, Treasure, & Conroy, 2007), dispositional achievement goals are critical determinants of student motivation because they give meaning to achievement and provide a framework for understanding different patterns of cognition, affect and behaviour. These goals are believed to guide the way individuals experience, interpret and act in achievement contexts (Maehr, 1989). Both mastery and performance goals underpin important motivational processes and there is evidence that distinct goal preferences have differential effects on student investment in learning (Pintrich, 2000).

Individuals endorsing a mastery goal are primarily concerned about the development of competence, and their focus is on the process of learning and task mastery. Consequently, achievement is determined by considering performance against internally referenced standards rather than by social comparison. In contrast, those endorsing a performance goal are primarily concerned about the demonstration of competence and self-validation. How one's ability compares to that of others is an important source of self-worth, so achievement tends to be derived from normative or comparative sources rather than self-referenced performance information (Duda & Hall, 2001; Elliot & Dweck, 2005).

Early research considered both mastery and performance goals to be appetitive, thereby encouraging individuals to seek out challenge and strive to achieve. However, Elliot and his colleagues (Church, Elliot, & Gable, 2001; Elliot & Church, 1997; Elliot, et al., 1999; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Harackiewicz, Barron, Tauer, & Elliot, 2002; McGregor & Elliot, 2002) have proposed that performance goals may encourage both approach and avoidance behaviour. When performance approach goals are endorsed they encourage individuals to seek out opportunities to demonstrate competence. Since individuals focus on the potential for positive outcomes, as well as the controllability and positive value of those outcomes, the motivational processes and the resulting patterns of cognition, affect and behaviour may be indistinguishable from those which can be observed when a mastery goal is endorsed. In contrast, when performance avoidance goals are held, individuals seek to avoid demonstrating low ability. As failure carries such a high negative value, attention is drawn not only to the prospect of failure, but also to perceptions of low competence and doubts over the controllability of achievement outcomes (Pekrun, Elliot, &

Maier, 2006). Behaviour is therefore regulated in accordance with the potential for negative outcomes (Elliot & Harackiewicz, 1996). It is this perceptual structure which evokes debilitating motivational processes that may ultimately lead to a helpless motivational pattern where effort is withdrawn in an attempt to protect self-esteem.
In the last decade, investigators have examined the impact of motivational goals on patterns of achievement behaviour in university students (Elliot & Church, 1997; Elliot & McGregor, 1999; McGregor & Elliot, 2002; Midgley et al., 2001; Pintrich, 2000). Their findings demonstrate that students' mastery goals are positively associated with both intrinsic motivation and subject interest but are unrelated to graded performance. In contrast, research has found that performance approach goals are positively associated with graded performance and are unrelated to intrinsic motivation or interest, whereas performance avoidance goals are negatively associated with graded performance, intrinsic motivation and subject interest (Elliot & Church, 1997; Midgley et al., 2001; Pintrich, 2000). This evidence suggests that the achievement goals endorsed by university students may not only have a considerable influence on educational achievement but also on motivational regulation. The motivational and performance impact of these goals may, however, be indirect, because of their influence on achievement-related cognition, affect and study behaviours (Elliot et al., 1999).

Various psychological mechanisms have been proposed to explain how different achievement goals underpin both positive and negative educational outcomes (Elliot et al., 1999). Elliot et al. (1999) found that adaptive strategies such as effort expenditure and persistence are key factors that mediate the relationship between both mastery and approach goals and exam performance. In contrast, they found that maladaptive strategies such as disorganised study behaviour undermine the exam performance of those with avoidance goals. The differential patterns of learning associated with each of the three achievement goals have been reported in other studies (Elliot & McGregor, 2001; McGregor & Elliot, 2002). For example, McGregor and Elliot (2002) found that both mastery and performance approach goals were associated with numerous adaptive processes such as the perception of preparedness, the appraisal of assessed work as a challenge, task absorption and heightened grade aspiration, while performance avoidance goals were linked to various maladaptive processes that have an undermining effect on learning and performance, such as threat appraisal, anxiety, desire to escape, procrastination and poor exam preparation. Similarly, Elliot and McGregor (2001) found that mastery goals were associated with deep processing skills, while performance avoidance goals were positively related to the use of surface processing skills, a learning strategy that is known to encourage superficial engagement with course material.

It is clear from such evidence that university students' strategies for learning are closely aligned with the goals which they endorse and that performance avoidance goals may be a critical antecedent of maladaptive patterns of learning. However, little is known about the role that these goals play as individuals move through the educational process. As a result, a number of researchers (Harackiewicz et al., 2002; Midgley et al., 2001) have called for more longitudinal investigations in order to understand how achievement goals engender different patterns of learning across programmes of study. The current research is a direct response to this call.

The purpose of the investigation was to examine whether students' achievement goals influenced patterns of achievement-related cognition and affect across three assessment points in a first-year research methods class for sport science students. Based on achievement goal theory (Elliot & Covington, 2001; Elliot & Dweck, 2005; Midgley et al., 2001), it was hypothesised that students exhibiting a motivational profile where scores for performance avoidance goals were elevated, and scores for mastery and performance approach goals were deflated, would demonstrate a debilitating pattern of achievement cognition and affect. It was further hypothesised that those exhibiting a motivational profile in which mastery goal scores were elevated and performance avoidance scores deflated would demonstrate an adaptive pattern of achievement cognition and affect. Finally, it was hypothesised that students exhibiting a profile in which performance approach goals were

elevated would demonstrate a broadly adaptive pattern of achievement cognition and affect because approach goals are underpinned by high levels of perceived competence (Elliot & Church, 1997).

Method

Participants

Following the receipt of ethical approval from the University's research ethics committee, a convenience sample, comprising 59 male (mean age = 19.3; SD = 1.5) and 40 female (mean age = 19.7; SD = 1.6) University of Bedfordshire sport and exercise science, sport studies and adventure recreation students, was selected. All participants were first-year students undertaking a module entitled *Introduction to methods of enquiry*. Participants completed a standard informed consent form before being asked, on seven different occasions over a period of 3 months, to complete a number of inventories containing various established measures.

Instruments

Achievement goals

Students' achievement goals were measured using Elliott and Church's trichotomous goal inventory (1997). This is an 18-item questionnaire that assesses the degree to which students endorse mastery goals (α = .91), performance approach goals (α = .89) and performance avoidance goals (α = .77) in the classroom. Students are asked to respond to a series of items (e.g., "In my university classes I prefer course material that really challenges me so I can learn new things"; "It is important for me to do better than other students in my university classes"; "My fear of performing poorly in my university classes is often what motivates me") and indicate the extent which they believe each item is true for them on a 1 (*not at all true of me*) to 7 (*very true of me*) Likert scale.

Academic self-determination

Self-determined motivation towards educational activities was assessed using Vallerand, Pelletier, Blais, Briere, Senecal and Vallieres' (1992) 28-item academic motivation scale. Students indicated their agreement with 28 items that provide responses to the stem, "Why do you go to university?" Three of the subscales purport to measure intrinsic forms of motivational regulation (e.g., "Because I experience pleasure and satisfaction while learning new things"), while three additional subscales measure identified regulation (e.g., "Because I think that a university education will help to prepare me better for the career I have chosen"), introjected regulation (e.g., "Because of the fact that when I succeed in my university classes I feel important") and extrinsic regulation (e.g., "In order to obtain a more prestigious job later on"). A further subscale measures amotivation (e.g., "I can't see why I go to university, and frankly I couldn't care less"). Level of agreement with each item was measured on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Vallerand et al. (1992) established that the seven subscales demonstrate acceptable levels of internal consistency (α = .72 to α = .87).

Perceptions of ability

Perceived ability was measured using an adapted version of Hall, Kerr and Matthews' (1998) perceived ability scale: a 4-item scale in which students are asked to rate their ability as a university student. Students responded to a stem that read: "If your lecturers were asked their opinions, how do you think they would rate your ability as a university student?" Responses were scored on a 7-point Likert scale ranging from 1 (very weak) to 7 (very strong). Smith, Duda, Allen and Hall (2002) indicated that the instrument is internally consistent (α = .85).

Ability-related self-esteem

Ability-related self-esteem was assessed using the 7-item performance subscale of Heatherton and Polivy's (1991) state self-esteem scale (α = .92). Students were asked to consider a number of statements which reflected feelings about academic performance in the methods of enquiry class (e.g., "I feel confident about my abilities"). They were then asked to

indicate agreement with each item on a 7-point Likert scale that ranged from 1 (strongly disagree) to 7 (strongly agree).

Motivated strategies for learning

Task value (how interesting, important and useful the course is: e.g., "I am very interested in the content area of this module"), control of learning beliefs (belief that their efforts to learn will result in positive outcomes: e.g., "If I study in appropriate ways, I will be able to learn the material for this module") and self-efficacy for learning (performance expectancy and confidence of doing well: e.g., "I'm certain I can understand the most difficult material presented in the readings for this module") were all assessed using scales from Pintrich, Garcia, Smith and McKeachie's (1991) motivated strategies for learning questionnaire. Students were asked to indicate their agreement with a series of items that reflected these constructs on a 7-point Likert scale that ranged from 1 (strongly disagree) to 7 (strongly agree). Pintrich et al. (1991) reported that the scales are internally consistent (α = .68 to .93).

Intrinsic interest

Intrinsic interest (enjoyment of the course) was measured using a 9-item adapted version of Harackiewicz et al.'s (2000) intrinsic interest towards the class scale (α = .93). Students were asked to reflect on a series of statements (e.g., "I think what we are learning in this module is interesting") and indicate their level of agreement with each statement on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Cognitive anxiety

Cognitive anxiety was measured using a 10-item subscale from Endler, Edwards and Vitelli's (1991) multidimensional anxiety scale (α = .90). The items reflected cognitive worry (e.g., "I feel inadequate") and students responded on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*).

Desire to escape

Desire to escape was assessed using a 5-item scale adapted from an instrument developed by McGregor and Elliott (2002) (α = .72). Students were asked to reflect on a series of statements about the forthcoming assignment (e.g., "I wish I could get out of taking this assignment") and indicate their level of agreement with each statement on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Ability-related self-esteem

Ability-related self-esteem was again measured using the performance subscale of Heatherton and Polivy's (1991) state self-esteem scale (e.g., "I feel confident about my abilities") (α = .92) and performance expectancy was measured with one item that asked students to report their anticipated grade for the upcoming assignment (e.g., "How confident you are that you can achieve each of the grades listed using a 0% to 100% scale?").

Post-performance cognition

Perceived success and performance satisfaction were assessed using single-item measures. Causal attributions for performance were measured using McAuley, Duncan and Russell's (1992) 12-item causal dimension scale II (e.g., "Is the cause something that you can regulate … or that you cannot regulate") (α = .67 to .82). Positive and negative affect was assessed using Watson, Clark and Tellegen's (1988) positive and negative affect scale (PANAS) (e.g., enthusiastic, irritable, ashamed, proud) (α = .84 to.90). Task value, control of learning beliefs and self-efficacy for learning was assessed using scales from Pintrich et al.'s (1991) motivated strategies for learning questionnaire, and intrinsic motivation was measured using Harackiewicz et al.'s (2000) intrinsic motivation towards the class scale (see earlier description of items and scale reliabilities).

Procedures

Data collection began 7 weeks into the academic year. This corresponded with the first lecture of the research methods and statistics block of the methods of enquiry module, which ran for the duration of an academic year. During the first lecture, participating students completed an inventory that assessed various motivational characteristics. In the lecture prior to submission of each of the three statistical assignments, participants completed an inventory that measured various cognitive and affective states. Performance feedback on

each assignment was provided within 1 week of the work being submitted. Participants were provided with feedback on their performance in each statistics assignment at the end of a lecture. Each student was given personal feedback in a sealed envelope. This contained their grade, the mean grade and the standard deviation for the assignment. On receipt of the feedback, participants were asked to complete an inventory that measured various performance-related cognitions and affective responses.

Results

Analytical strategy

In order to examine whether the goal profiles of students impacted upon their achievement-related cognition, affect and behaviour, three distinct groups were formed by way of a cluster analysis. Subsequent analyses utilising multivariate analysis of variance (MANOVA) were conducted to determine whether the groups reported different motivational experiences before and after the submission of three pieces of assessed coursework.

Reliability analysis

Reliability analyses were conducted on the multiple-item measures used in the present investigation. All scales were found to have acceptable levels of internal consistency. Only the performance avoidance scale ($\alpha = .64$) and one measure of control of learning beliefs ($\alpha = .66$) were found to have internal reliability coefficients below the recommended level of $\alpha = .70$ (Nunnally, 1978). However, the internal consistency of these scales was considered acceptable due to the small number of items that constituted each measure (Loewenthal, 2001).

Group formation through cluster analysis on motivational goals

In order to examine whether students' goals differentially influenced patterns of achievement-related cognition and affect during a 7-week period of continuous assessment it was first necessary to group students by means of their achievement goal profiles. As performance and mastery goals are commonly believed to be orthogonal (Duda & Hall, 2001; Nicholls, 1989; Roberts, 2001), it was not possible to separate individuals into distinct mastery, performance approach and performance avoidance groups as each participant's motivation would vary on all three goal dimensions. Therefore, goal profiles were identified by means of a cluster analysis, and repeated measures MANOVA was used to test for differences in achievement-related cognition and affect in those exhibiting different profiles.

Consistent with research examining motivation profile groups in sport (Cumming, Hall, Harwood & Gammage, 2001; Hodge & Petlichkoff, 2000; Lemyre, Hall, & Roberts, 2007; Raedeke, 1997; Raedeke, Granzyk, & Warren, 2000; Weiss, Ebbeck, & Horn, 1997), cluster analysis was employed to generate groups exhibiting distinct motivational profiles on the three achievement goals. The achievement-related cognition and affect reported by members of the different cluster groups were then examined on several occasions over the 7-week duration of the study to determine if the cluster groups demonstrated clear motivational differences. The data were first standardised and K-means cluster analysis was then employed to classify students according to their scores on the mastery, performance approach and performance avoidance goals. This partitioning method of cluster analysis was selected in order to maximise both the homogeneity within groups and the distances between the cluster groups (Lattin, Carroll, & Green, 2003). A three-cluster solution was selected as it demonstrated conceptual coherence and identified a meaningful number of participants in each cluster.

The first cluster comprised 44 students whose cluster centre laid .80 standard deviations above the mean on the performance approach variable, .50 standard deviations above the mean on the mastery variable and .32 standard deviations above the mean on the performance avoidance scale. This group was labelled as *achievement-oriented overstrivers* as members appeared strongly motivated to demonstrate comparative ability, avoid comparative failure and strive for personal improvement.

The second cluster comprised 22 students whose cluster centre laid .41 standard deviations below the mean on the performance approach variable, .15 standard deviations above the mean on the mastery variable and 1.17 standard deviations below the mean on the performance avoidance scale. This group was labelled as *mastery-oriented* as the mastery goal appeared to have a strong positive influence on members' motivational profile while scores on both performance goals were well below the sample means.

The third cluster comprised a further 33 students whose cluster centre lay .67 standard deviations below the mean on the performance approach variable, .66 standard deviations below the mean on the mastery variable and .56 standard deviations above the mean on the performance avoidance scale. This group was labelled as *failure-avoidant* because the performance avoidance goal appeared to have a dominant influence on members' motivational profile in comparison to the other two goals. To test the stability of the three-cluster solution, a two-thirds random sample recluster analysis was undertaken (Hair, Anderson, Tatham, & Black, 1995). Approximately 98 % of the students were identified as members of their original clusters, supporting the stability of the three-cluster solution. The cluster centres and the achievement goal means for each cluster are reported in Table 1.

	Cluster centres	**Mean**	**SD**
Cluster 1: Achievement-oriented overstrivers (n = 44)			
Performance approach	0.80	5.05	0.61
Mastery	0.50	5.96	0.52
Performance avoidance	0.32	5.14	0.57
Cluster 2: Mastery-oriented students (n = 22)			
Performance approach	-0.41	3.61	0.95
Mastery	0.15	5.66	0.53
Performance avoidance	-1.17	3.68	0.59
Cluster 3: Failure-avoidant students (n = 33)			
Performance approach	-0.67	3.29	0.93
Mastery	-0.66	4.96	0.92
Performance avoidance	0.56	5.37	0.55

Table 1: Cluster centres and achievement goal means

Between-group differences in achievement-related cognition and affect

A number of MANOVAs were undertaken to determine whether students in the three clusters demonstrated different patterns of achievement-related cognition and affect associated with their assessed work in a research methods module. A one-way MANOVA was undertaken to examine whether students in the three clusters differed in self-determined motivation towards educational activities. The analysis revealed a significant multivariate effect for cluster: Pillai's trace = .25, F (14, 182) = 1.82, $p < .05$ ($\eta_p^2 = .12$). Follow-up univariate analyses indicated that there were significant between-group differences on all but the extrinsic regulation and amotivation scales. Table 2 shows that students in the failure-avoidant cluster reported significantly lower scores on intrinsic forms of regulation than those in the other two clusters. Further, while students in the mastery cluster demonstrated lower scores on all the extrinsic regulation scales when compared to the other two clusters, these differences were only found to be significant for identified regulation. In sum, the results of this analysis suggest that prior to undertaking any assigned work on a first-year research methods module, motivational differences were evident between students reporting distinct goal profiles. Specifically, those considered to be mastery-oriented or achievement-oriented overstrivers reported greater levels of intrinsic interest in comparison to the failure-avoidant group.

Variable	Mean	SD	F	Sig	η_p^2
Intrinsic motivation to know			*7.66*	*.001*	*.14*
Achievement-oriented overstrivers	5.71[a]	0.71			
Mastery-oriented	5.43[a]	0.81			
Failure-avoidant	4.91[b]	1.11			
Intrinsic motivation to accomplish			*4.54*	*.01*	*.09*
Achievement-oriented overstrivers	5.04[a]	0.83			
Mastery-oriented	4.96[a]	0.72			
Failure-avoidant	4.43[b]	1.07			
Intrinsic motivation stimulation			*4.72*	*.01*	*.09*
Achievement-oriented overstrivers	4.59[a]	0.89			
Mastery-oriented	4.36	0.95			
Failure-avoidant	3.93[b]	0.94			
Identified regulation			*4.06*	*.02*	*.08*
Achievement-oriented overstrivers	5.97[a]	0.53			
Mastery-oriented	5.50[b]	0.87			
Failure-avoidant	5.65	0.75			
Introjected regulation			3.21	.05	.06
Achievement-oriented overstrivers	5.27	0.79			
Mastery-oriented	4.75	1.13			
Failure-avoidant	4.80	1.03			
Extrinsic regulation			1.47	.23	.03
Achievement-oriented overstrivers	5.35	0.88			
Mastery-oriented	5.01	1.02			
Failure-avoidant	5.44	0.96			
Amotivation			0.82	.44	.02
Achievement-oriented overstrivers	1.83	0.86			
Mastery-oriented	1.88	1.03			
Failure-avoidant	2.14	1.29			

Table 2: Self-determination cluster means
Variables with different superscripts differ significantly at $p < .05$ [a] [b]

A 3 x 3 (cluster by trials) repeated measures MANOVA was undertaken to examine whether students in the three clusters differed in their pre-assignment cognitions over the period of assessment. The results indicated significant multivariate main effects for cluster groups: Pillai's trace = .31, F (10, 186) = 3.41, $p < .001$ ($\eta_p^2 = .16$), and for trials: Pillai's trace = .37, F (10, 87) = 5.06, $p < .001$ ($\eta_p^2 = .37$), while a cluster by trials interaction was not found to be significant. Follow-up univariate analysis indicated that students in the mastery cluster demonstrated significantly lower scores on cognitive worry and desire to escape than those in the other two groups (see Table 3). In addition, over the period of assessment, all students exhibited fluctuations in confidence, a slight decrease in cognitive worry and an increase in desire to escape the assignment. Overall, the results of this analysis demonstrate that mastery-oriented students appear less anxious about forthcoming assessments than either achievement-oriented overstrivers or failure-avoidant students.

	Assignment 1		Assignment 2		Assignment 3		Cluster effect			
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SE**	**Sig**	**η_p^2**
Confidence									*.001*	*.08*
AOO	40.98	11.67	49.96	17.69	43.95	18.38	44.97	2.01		
MO	45.54	13.45	49.16	14.98	43.41	16.07	46.02	2.84		
FA	39.68	15.10	44.20	15.73	41.49	17.13	41.79	2.32		
TE*	41.56	13.34	47.86	16.52	43.01	17.34				
Cognitive worry									*.001*	*.11*
AOO	2.81	0.72	2.49	0.80	2.64	0.76	2.65[a]	0.09		
MO	2.16	0.64	1.96	0.69	1.90	0.79	2.01[b]	0.14		
FA	3.03	0.55	2.69	0.76	2.61	0.92	2.78[a]	0.11		
TE*	2.74	0.72	2.44	0.80	2.47	0.87				
Desire to escape									*.05*	*.04*
AOO	5.02	1.26	4.97	1.23	5.18	1.25	5.06[a]	0.16		
MO	3.83	1.26	3.65	1.46	4.23	1.51	3.90[b]	0.22		
FA	5.13	1.01	5.23	1.11	5.29	0.98	5.22[a]	0.18		
TE*	4.79	1.28	4.76	1.37	5.01	1.29				
Grade I should get									*.13*	*.02*
AOO	57.72	12.96	60.02	13.23	57.22	14.77	58.32	1.64		
MO	57.45	10.70	59.00	17.15	58.22	18.36	58.23	2.32		
FA	53.10	10.98	56.66	12.23	52.00	12.71	53.92	1.89		
TE*	56.12	11.93	58.67	13.82	55.70	15.09				
Grade I will get									*.06*	*.03*
AOO	48.07	11.67	53.59	17.69	49.36	18.38	50.34	1.48		
MO	49.92	13.45	51.80	14.98	52.36	16.07	51.36	2.09		
FA	45.97	15.10	48.00	15.73	46.50	17.13	46.82	1.71		
TE*	47.78	13.34	51.33	16.52	49.07	17.34				

Table 3: Pre-assessment cognition and affect
* Significant trials effect $p < .05$; variables with different superscripts differ significantly at $p < .05$ [a b]; AOO = achievement-oriented overstrivers; MO = mastery-oriented; FO = failure-avoidant; TE= trials effect

A 3 x 4 (cluster by trials) repeated measures MANOVA was undertaken to determine whether a further set of cognitions and affective responses, measured before the first assignment, and again after receiving feedback on each of the three assignments, differed as a function of cluster membership. The MANOVA results indicated significant multivariate main effects for cluster groups: Pillai's trace = .26, F (12, 184) = 2.29, $p < .01$ ($\eta_p^2 = .13$) and for trials: Pillai's trace = .48, F (18, 79) = 4.09, $p < .001$ ($\eta_p^2 = .48$), while a Cluster x Trials interaction was not found to be significant. Follow-up univariate analysis indicated that students in the failure-avoidant cluster reported significantly lower scores on perceived ability, academic-related self-esteem, task value, control beliefs and efficacy for learning, while those in the mastery cluster reported significantly higher intrinsic interest in the subject than students in the failure-avoidant group (Table 4). It is clear from these findings that failure-avoidant students perceive lower ability and express lower academic confidence with respect to research methods than mastery-oriented students. It is also feasible that this lack of academic efficacy may explain why they perceive the assessment tasks to have less value than students in the other groups.

	Pre-assessment		Assignment 1		Assignment 2		Assignment 3		Cluster effect			
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SE**	**Sig**	**η_p^2**
Perceived ability											*.01*	*.04*
AOO	4.44	0.56	4.21	0.84	4.23	0.71	4.34	0.62	4.31[a]	0.11		
MO	4.70	0.93	4.44	0.79	4.48	1.03	4.36	0.97	4.50[a]	0.15		
FA	3.83	0.72	3.75	0.90	3.70	0.97	3.71	1.04	3.75[b]	0.12		
TE*	4.30	0.78	4.11	0.88	4.11	0.92	4.13	0.90				
Academic-related self-esteem											*.001*	*.06*
AOO	4.39	0.96	3.86	0.97	4.22	1.06	4.22	0.98	4.17[a]	0.12		
MO	4.81	0.80	4.60	0.94	4.72	0.90	4.63	1.00	4.69[b]	0.17		
FA	3.85	0.85	3.48	0.97	4.03	0.96	3.95	1.00	3.75[a]	0.13		
TE*	4.30	0.95	3.90	1.04	4.26	0.01	4.22	1.02				
Task value											*.001*	*.08*
AOO	4.46	0.89	4.16	1.16	3.96	0.99	3.97	1.22	4.14	0.13		
MO	4.67	0.87	4.25	1.25	4.17	1.34	4.30	1.09	4.35[a]	0.29		
FA	4.02	1.00	3.76	1.24	3.70	1.05	3.59	1.05	3.77[b]	0.16		
TE*	4.36	0.95	4.05	1.21	3.92	1.10	3.92	1.16				
Control beliefs for learning											*.001*	*.08*
AOO	5.40	0.86	5.31	0.88	5.18	0.82	5.06	0.92	5.24	0.10		
MO	5.47	0.67	5.30	0.59	5.07	1.17	5.17	0.82	5.25	0.14		
FA	5.12	0.69	5.09	0.84	4.57	1.03	4.75	1.02	4.88	0.12		
TE*	5.33	0.77	5.23	0.81	4.95	1.00	4.98	0.94				
Self-efficacy for learning											*.05*	*.03*
AOO	4.25	0.84	4.04	0.89	4.03	1.01	4.16	0.88	4.12[a]	0.13		
MO	4.62	0.79	4.35	0.93	4.17	1.27	4.44	1.19	4.40[a]	0.18		
FA	3.59	1.06	3.48	1.24	3.53	1.17	3.78	1.15	3.60[b]	0.14		
TE*	4.11	0.98	3.92	1.07	3.89	1.15	4.10	1.07				
Intrinsic interest in the subject											*.001*	*.06*
AOO	3.92	0.88	3.48	1.05	3.70	1.01	3.41	18.38	3.62	0.13		
MO	4.38	0.73	3.97	1.07	3.78	1.24	3.95	16.07	4.02[a]	0.18		
FA	3.41	1.03	3.24	1.05	3.13	1.10	3.27	17.13	3.26[b]	0.15		
TE*	3.85	0.97	3.51	1.08	3.53	1.09	3.48	17.34				

Table 4: Post-assessment cognition and affect
* Significant trials effect $p < .05$; Variables with different superscripts differ significantly at $p < .05$ [a b]; AOO = achievement-oriented overstrivers; MO = mastery-oriented; FO = failure-avoidant; TE= trials effect

A further 3 x 3 (cluster by trials) repeated measures MANOVA was undertaken to determine whether attributions and affect, measured after each of three assignments, differed as a function of cluster membership. The MANOVA indicated a significant multivariate main effect for trials Pillai's trace = .24, F (12, 85) = 2.32, $p < .05$ ($\eta_p^2 = .24$), while the main effect for cluster and the cluster by trials interaction were not found to be significant. Follow-up univariate analysis revealed that students experienced decreased positive affect and an increasing perception that, over time, others had little influence over achievement outcomes (Table 5). It is evident from this analysis that while there were no between-group differences in attributions, all three groups of students experienced a decrease in positive affect over the course of the research methods module.

	Assignment 1		Assignment 2		Assignment 3		Cluster effect	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SE**
Locus of causality								
AOO	-1.06	1.21	-0.74	1.70	-1.08	1.61	-0.96	0.15
MO	-1.06	1.61	-1.45	1.33	-1.21	1.39	-1.24	0.21
FA	-0.81	1.55	-0.91	1.53	-1.03	1.25	-0.92	0.17
TE*	-0.98	1.41	-0.95	1.58	-1.09	1.44		
Stability								
AOO	0.08	1.59	0.56	1.57	0.16	1.74	0.27	0.17
MO	0.07	1.81	0.16	1.21	0.14	1.42	0.12	0.25
FA	-0.29	1.55	0.05	1.58	0.12	1.44	-0.03	0.20
TE*	-0.04	1.62	0.30	1.62	0.14	1.56		
Internal control								
AOO	5.02	1.26	4.97	1.23	5.18	1.25	-1.2	0.15
MO	3.83	1.26	3.65	1.46	4.23	1.51	-1.4	0.22
FA	5.13	1.01	5.23	1.11	5.29	0.98	-1.0	0.18
TE*	4.79	1.28	4.76	1.37	5.01	1.29		
External control								
AOO	-0.01	1.58	0.73	1.45	0.61	1.45	0.44	0.16
MO	0.10	1.53	0.28	1.27	0.42	1.31	0.27	0.22
FA	-0.24	1.47	0.46	1.42	0.64	1.43	0.28	0.18
TE*	-0.06	1.52	0.54	1.40	0.58	1.40		
Positive affect								
AOO	2.92	0.95	2.53	0.82	2.62	0.83	2.69	0.10
MO	2.80	0.74	2.81	0.92	2.79	1.09	2.80	0.14
FA	2.85	0.92	2.45	0.77	2.41	0.72	2.57	0.12
TE*	2.87	0.89	2.57	0.83	2.59	0.86		
Negative affect								
AOO	1.70	0.66	1.75	0.72	1.62	0.65	1.69	0.08
MO	1.66	0.59	1.43	0.53	1.52	0.54	1.54	0.12
FA	1.73	0.79	1.70	0.73	1.84	0.88	1.76	0.10
TE*	1.70	0.69	1.66	0.69	1.67	0.72		

Table 5: Attributions and affect
* Significant trials effect $p < .05$; variables with different superscripts differ significantly at $p < .05$ $^{a\ b}$; AOO = achievement-oriented overstrivers; MO = mastery-oriented; FO = failure-avoidant; TE= trials effect

Discussion

The results from the present investigation provide evidence that, for first-year sport science students studying research methods, the endorsement of different achievement goals leads to the exhibition of distinct patterns of achievement-related cognition and affect, which may act to facilitate or impair learning and performance (Elliot & Church, 1997; Midgley et al., 2001; Pintrich, 2000). Specifically, the findings suggest that more adaptive patterns are associated with achievement goal profiles, where mastery and performance approach goals are accentuated; and that potentially maladaptive patterns are associated with goal profiles that appear dominated by both performance avoidance goals and suppressed mastery goals.

A cluster analysis performed on students' mastery, performance approach and performance avoidance goals enabled the creation of three groups, each exhibiting a distinct goal profile. The first group, labelled achievement-oriented overstrivers, reported high scores on all three achievement goals. The term *overstriver* was first coined by Covington (1992) to describe students whose motivation reflected an intense desire to succeed in order to avoid failure and thereby demonstrate self-worth. Elevated scores on all three goals reflect a similar pattern in this sample. A second group, labelled mastery-oriented, exhibited high scores for mastery goals and lower scores for both performance approach and performance avoidance goals. A third group, labelled failure-avoidant, exhibited low scores for mastery goals, low scores for performance approach goals and high scores for performance avoidance goals.

The academic pitfalls of exhibiting a failure-avoidant profile

An examination of the regulatory strategies underpinning students' academic investment revealed clear motivational differences between the three groups. Both the mastery-oriented students and the achievement-oriented overstrivers reported significantly higher levels of intrinsic regulation than students in the failure-avoidant group. The findings suggest that failure-avoidant students in this first-year module are concerned at the prospect of their perceived inadequacies becoming publicly exposed. It may be that, owing to a preoccupation with self-validation, their reasons for engagement in the process of learning appear low in self-determination. Consequently, they do not exhibit the desire for knowledge, the love of academic stimulation and accomplishment, or the high aspirations for personal development shown by both mastery-oriented students and achievement-oriented overstrivers.

This pattern is, however, consistent with research by Elliot and Church (1997) and by Harackiewicz et al. (2002), which showed that performance avoidance goals tend to be negatively related to enjoyment of the class, subject interest and intrinsic motivation in college students. This means that failure-avoidant students may be more likely to adopt an instrumental approach to learning in research methods and statistics. For these individuals, investment in the module is largely due to extrinsically induced pressures or a perceived obligation rather than any intrinsic desire for learning. The motivational implications of this approach are that when students are not intrinsically motivated to learn, they will only engage with the subject in order to access rewards or avoid negative outcomes. Investment, therefore, tends to be superficial (Brophy, 1987; Elliot & McGregor, 2002). Those teaching research methods courses to undergraduate students should note that students exhibiting a failure-avoidant profile may need considerable enticement to engage with challenging or novel material because the increased potential for demonstrating a lack of ability poses such a threat to self-worth.

While the extrinsic motivational regulation of failure-avoidant students is not in itself problematic when students do engage, this goal profile leads to other motivational patterns that may further impair both learning and performance, and lead to long-term difficulties (Middleton & Midgley, 1997). In the present study, an examination of students' cognitions and affective responses measured in the lead-up to three assessments indicated that both failure-avoidant students and achievement-oriented overstrivers demonstrated higher levels of cognitive worry and desire to escape as each assignment approached. These findings are consistent with previous research that has found a performance avoidance goal to be associated with a pattern of cognition and affective responses that may undermine both learning and academic performance (Church et al., 2001; Elliot & Church, 1997; Elliot et al., 1999). For example, McGregor and Elliot (2002) found that cognitive worry is a mediator of the negative association between performance avoidance goals and exam performance in college students. Further studies have found that avoidance goals lead to surface processing of information, disorganised study behaviours (Elliot et al., 1999) and less use of available practice time (Cury, Elliot, Da Fonseca, & Moller, 2006), strategies that clearly inhibit the learning of complex material characteristic of research methods modules.
The potentially maladaptive pattern of cognition and affect exhibited by failure-avoidant students prior to assessment was also displayed after the receipt of feedback on assignments. The findings indicated that avoidant students demonstrated lower perceived ability, academic-related self-esteem and self-efficacy for learning than mastery-oriented

students or achievement-oriented overstrivers. In addition, they also reported that the task had less value and expressed lower intrinsic interest in the subject than did mastery-oriented students.

This debilitating motivational pattern should be of concern to teaching staff because, in the present investigation, it was exhibited almost immediately on entry to university by approximately one third of students studying for sport-related degrees. It is not possible to ascertain from the present study whether this motivational pattern is a function of a global disposition or the specific educational context (cf. Vallerand, 1997). However, this cohort of failure-avoidant students might be designated as academically and psychologically vulnerable, not only because they lack self-determination, but also because they question their ability, express low academic self-esteem and exhibit little sense of belief that they can control educational outcomes. In addition, they display low efficacy for learning, little interest in the subject matter and attempt to protect a fragile sense of self-worth by deluding themselves that the subject matter is of little importance. They convince themselves that research design and statistics are inconsequential because the subjects are tangential to the sub-disciplinary or practical content of their degree. Anxiety and thoughts of escape characterise the period before the submission of assessed work, and low self-belief and low intrinsic interest feature prominently following performance, regardless of the outcome.

This pattern of cognition, affect and behaviour is not limited to sport students, but is consistent with findings from other academic contexts reported by Shim and Ryan (2005). They found that students endorsing performance avoidance goals exhibited reduced efficacy, intrinsic value of academic work and a propensity to avoid challenge over the duration of a psychology course. Similar findings were reported by Pekrun et al. (2006), who established that, when endorsing avoidance goals, students exhibit negative achievement emotions such as anxiety, shame and a sense of hopelessness because they lack the belief that the investment of effort will lead to positive outcomes.

Other research that has examined sport science students' motivation and performance in statistics classes (Lane, Hall, & Lane, 2002) has reported that when students experience difficulty it becomes manifest as low confidence. Wilson, Hassall, Joyce, Piekarz and Arquero Montaño (2006) argued, however, that before skill development to aid numeracy can take place, it is necessary to address student apprehension. Clearly, changing the pattern of cognition and affect displayed by failure-avoidant students involves more than inducing efficacy. This point emerges from the present findings, as the achievement-oriented overstrivers demonstrated a similar level of apprehension, desire to escape and academic self-esteem as the failure-avoidant students, despite exhibiting considerably high perceived ability.

The evidence from the present research points to the fact that, in order to enhance academic motivation, it may be beneficial to consider manipulating the way students view achievement and give meaning to success and failure in the classroom. Encouraging students to view achievement in a self-referenced, mastery-oriented manner will induce a greater sense of control over learning outcomes, reduce self-focused attention and lead to more adaptive patterns of achievement-related cognition, affect and behaviour (Duda & Hall, 2001; Elliot & Church, 1997; McGregor and Elliot, 2002; Middleton & Midgley, 1997).

The academic benefits of a mastery profile

The present findings clearly demonstrate that the mastery-oriented cluster of students exhibited a more adaptive motivational profile over the period of study. Because investment in learning is predominantly self-regulated, these students tended to see assessed work as a challenge rather than as a threat to self-worth or as an occasion when inadequacy may be highlighted in a valued domain (Dweck, 1999). This was confirmed by lower reported levels of cognitive worry and thoughts of escape before each assignment. Following feedback on each assignment, the same students experienced higher self-related cognitions and intrinsic interest than those in the avoidant group, and higher academic esteem than the overstrivers. The findings suggest that endorsing a mastery goal at the expense of performance goals

enables students to remain engaged with the material to be learned across the duration of a module because it focuses attention on the process of learning and self-referenced accomplishment, rather than on performance outcome or how one's academic ability compares to that of others. The findings are, therefore, consistent with other research that has demonstrated the adaptive nature of endorsing mastery goals, and support the recent views of Moller and Elliot (2006) who, based on a review of the educational literature, concluded that the consequences of adopting mastery goals are overwhelmingly and consistently positive.

The vulnerability of achievement-oriented overstrivers

It is interesting to note that the group of achievement-oriented overstrivers also exhibited a more adaptive motivational pattern in comparison to students in the failure-avoidant group. This is consistent with other research that has found that endorsing performance approach goals can be motivationally beneficial when students also endorse a mastery goal or maintain high perceptions of ability (Carr, 2006; Harackiewicz, Barron, & Elliot, 1998; Midgley et al., 2001). The profile of the achievement-oriented overstrivers does provide some cause for concern, however, because of students' elevated anxiety levels and desire for escape in the lead-up to each assessment. Such a finding indicates that this group may also be motivationally vulnerable if learning or performance difficulties were to occur. While it was not possible to assess the impact that multiple perceived failures would have on achievement-related cognition and affect in this study, recent research by Nien and Duda (2008) indicated that overstrivers and failure-avoidant students may experience motivational debilitation under these circumstances. Using an experimental study that entailed manipulation of achievement failure, Nien and Duda found that after just two objective failures on an endurance task, those endorsing performance goals exhibited a pattern of debilitating cognition reflective of helplessness. Conversely, those endorsing mastery goals exhibited a more positive pattern of cognition and affect under the same conditions.

Strategies to enhance student motivation to learn in research methods modules

While it is clear that further longitudinal research needs to be undertaken with larger samples in order to examine the learning strategies that students adopt as a function of their goal profiles, it is possible to draw some conclusions and make recommendations about how to aid sport students' motivation in research methods and statistics classes. First, students should be informed in their induction to higher education programmes about the influence of different achievement goals on patterns of motivation, and they should be actively encouraged to adopt mastery goals in academic achievement contexts. This is because Nicholls (1989) and others (Duda, 2005; Dweck, 2006; Elliot & Dweck, 2005) have suggested that the promotion of a mastery orientation will enhance the quality of motivation and equality of learning opportunities for all students. Encouraging dispositional mastery goals may require the development of training programmes such as the one advocated by Dweck (2006), which uses a form of cognitive restructuring to develop a mastery-oriented mindset that students can employ as they embark upon a career in higher education. In addition, a more indirect approach may be employed by lecturers, which involves structuring both the curriculum and the learning environment so that students are provided with opportunities for success that are defined in self-referent terms. Ames (1992) argued that when students pursue optimally challenging goals, perceive autonomy in the activities they undertake, are recognised for personal improvement, are grouped to encourage collaborative learning, are encouraged to plan monitor and evaluate personal progress, and are provided with sufficient time for effective learning to occur, they will be encouraged to pursue mastery-oriented goals in that specific environment. Moreover, Brophy (1987) has argued strongly that if teachers wish to help students internalise a mastery orientation as a permanent and stable characteristic, they must model and apply these principles consistently, thereby socialising students' motivation to learn.

The creation of a mastery-oriented climate by teaching staff enables vulnerable students to take risks without feeling threatened. The provision of autonomy support and encouragement

to use academic goal setting will undoubtedly help to entice those who may feel threatened to engage. Effective academic goal setting involves strategic planning of independent learning, along with the monitoring and self-regulation of performance against self-referenced standards. The continued investment of effort, when accompanied by performance improvement, will enhance efficacy, fulfil competence needs, lead to heightened self-determination and encourage students to gravitate away from an instrumental approach to learning. Enabling students to engage with the process of learning, perceive a sense of personal control, while de-emphasising the importance of normative or comparative outcomes as a reflection of achievement, will help to enhance the quality of motivation in sport students and thereby counteract failure avoidance in a potentially vulnerable group.

Conclusions

Notwithstanding the fact that this investigation was conducted on a small sample of students from a single university, the study revealed some interesting motivational patterns that may provide an explanation of individual differences in subject engagement for first-year sport students studying research methods. Those students with a failure-avoidant goal profile exhibited a potentially debilitating pattern of cognition and affect. If this profile were to be maintained throughout a student's degree programme, it would increase the probability of using behavioural strategies designed to protect self-worth that may undermine both the learning and performance of important research skills. Exhibiting a mastery profile would, however, encourage a more adaptive pattern of cognition and affect in students faced with challenging material in research methods, and this has clear motivational benefits. The findings from this and other studies suggest that university teaching staff must consider how best to promote a mastery approach to learning in their undergraduate students, which encourages students to focus on the process and value of learning rather than the implications and consequences of graded performance outcomes.

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